

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. 10/625,328 Applicant Sebastian Weitbrich
Confirmation No. 7767 Art Unit 2626
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Examiner Caschera, Antonio A.

Title: METHOD AND DEVICE FOR PROCESSING VIDEO DATA FOR
DISPLAY ON A DISPLAY DEVICE

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

DECLARATION OF DONALD WILLIS UNDER 37 C.F.R. 1.132

I, Donald Willis, declare:

1. I hold a Master of Science Degree in Electrical Engineering from Purdue University, West Lafayette, IN, awarded in 1968. I also hold a Bachelor of Science Degree in Electrical Engineering from the University of Maryland, College Park, MD, awarded in 1962.
2. I have been engaged professionally in the field of design and analysis of systems for processing video data, (the "Field") on a full time basis for approximately 42 years. I held the title of Manager of Digital Video Processing for Thomson for about five years. My honors include receiving the Thomson Chairman's Award (September 14, 2000) in connection with development of Thomson's first widescreen television.
3. I am familiar with the design and operation of systems for processing video data for display as a result of my foregoing education and professional experience.
4. I am a named inventor on approximately 156 granted patents and approximately 10 pending patent applications in the Field.
5. I have reviewed the above-captioned United States patent application (serial number 10/625,328) as filed on July 23, 2003, the Office action dated July 15, 2009, and the claims attached as Appendix A. I understand that claims 1-6

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10. By way of further non-limiting example, a similar figure is shown in Fig. 4 of the European Patent Application published as EP 1136974A1, which application is also disclosed in the Applicant's specification on page 3, lines 26-27. Analogously, the block diagram of the embodiment disclosed in Applicant's figure 3 provides sufficient information for one practicing in the Field at the time of filing of the present application to make or use the claimed invention, without undue experimentation.
11. Dithering devices had been achieved prior to the filing of the present application. Moreover, dithering hardware was well known to those practicing in the Field at the time of filing of the present application. For example, U.S. Patent No. 5,389,948, issued February 14, 1995, discloses, in Figs. 2 and 2(a), and col. 3, line 65 to col. 5, line 64, hardware for use in dithering.
12. Motion estimation was also well known at the time of filing of the present application, and one practicing in the Field at the time of filing of the present application would have been able to implement motion estimator 14 of Fig. 3 or Fig. 4 of the application without undue experimentation. By way of example, the prior art of record, such as U.S. Patent No. 6,421,466 (Lin), discusses various types of motion estimation in the Background of the Invention section, at col. 1, line 31 to col. 3, line 29, and Figs. 1-3. This discussion shows that one practicing in the Field at the time of filing of the present application could have made the motion estimator as recited in present claim 17 without undue experimentation.
13. By way of further example, the Applicant's specification further states on page 12, lines 19-21 that "Although the present embodiment requires the use of a motion estimator, such a motion estimator is already mandatory for other skills like false contour compensation, sharpness improvement and phosphor lag reduction." US Patent 6,473,464 issued on October 29, 2002 describes such motion estimators associated with false contour compensation, and further states in column 5, lines 38-42 of US Patent 6,473,464 "As motion estimators are well-known from, for example 100 Hz up-conversion technique and also from MPEG coding etc., they are well-known in the art and there is no need to describe them in greater detail here. As an example where a

motion estimator is described which could be used in this invention, it is referred to WO-A-89/08891."

14. As further evidence, I have been enabled from the specification and drawings of the present application to produce a design for a hardware circuit of a fundamental dithering arrangement, standard in the prior art, in which a $(M+N)$ -bit video signal is dithered (i.e. added to) with an N-bit dither (Φ), with the sum truncated (i.e. divided by N) to produce an M-bit dithered video signal. This designed hardware circuit was deduced from the Applicant's specification on page 3, lines 26-27, directing EP 1136974A1, in particular from paragraph [0010] of the above EP 1136974A1 which states in relevant part "To achieve a better grey scale portrayal, a dithering signal is added to the video signal, before truncation to the final video grey scale amplitude bit resolution. As mentioned before, dithering per se is a well-known technique from the technical literature, used to reduce the effects of quantization noise due to a reduced number of displayed resolution bits. With dithering, some artificial levels are added in-between the existing video levels."
15. As still further evidence, I have been enabled from the present specification and drawings to produce a design for a hardware circuit to generate a 3-D version of an N-bit dither (Φ), common in the art and useful in implementing the claimed dithering function. This designed hardware circuit was deduced from the references cited in page 3, lines 23-29 of Applicant's specification.
16. As still further evidence, I have been enabled from the present specification and drawings to produce alternative designs for hardware circuits useful in implementing the claimed dithering function configured to generate a new dithering pattern by utilizing the outputs of a motion estimator. These designed hardware circuits were deduced from the equations disclosed on page 9, line 27, through page 10, line 17, of Applicant's specification as currently amended to correct for editorial anomalies.
17. Based on the specification and the figures of the present application, one practicing in the Field at the time of filing of the present application would have been enabled to practice the method of processing video data of video pictures in a video data processing device for display on a display device having a plurality of luminous elements to suppress a dithering pattern from

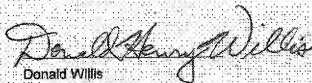
appearing to a viewer observing a moving object on the picture as claimed in claim 1.

18. Based on the specification and the figures of the present application, one practicing in the Field at the time of filing of the present application would have been enabled to make and use the device for processing video data of video pictures for display on a display device having a plurality of luminous elements as claimed in claim 17.

19. The specification of the present application contains the manner and process of making and using the claimed invention in such full, clear, concise, and exact terms as to enable one practicing in the Field at the time of filing of the present application, to make and use the same.

20. I hereby declare that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true, and I am warned that willful false statements and the like are punishable by fine or imprisonment, or both, (18 USC §1001) and may jeopardize the validity of the application or any patent issuing thereon.

Dated: November 12, 2009


Donald Willis

Appendix A

1. (Currently Amended) A method for processing video data of video pictures in a video data processing device for display on a display device having a plurality of luminous elements to suppress a dithering pattern from appearing to a viewer observing a moving object on the picture, the method comprising:
 - applying a dithering function to at least part of said video data in a dithering device of the video data processing device, wherein the dithering improves a grey scale portrayal of video pictures of said video data,
 - computing at least one motion vector representing the movement of a moving object on a picture from said video data, ~~by using~~ in a motion estimator device of the video data processing device; ~~[[for]]~~
 - changing at least one of the phase, amplitude, spatial resolution and temporal resolution of said dithering function in accordance with said at least one motion vector when applying the dithering function to said video data in the dithering device of the video data processing device to suppress a dithering pattern from appearing to a viewer observing the moving object on the picture; and
 - outputting the dithered video data from the video data processing device to the display device to suppress a dithering pattern from appearing to a viewer observing the moving object on the picture on the display device.
2. (Previously Presented) The method according to claim 1, wherein said dithering function includes two spatial dimensions and one temporal dimension.

3. (Previously Presented) The method according to claim 1, wherein said dithering function includes the application of a plurality of masks.
4. (Previously Presented) The method according to claim 1, wherein said applying of said dithering function is based on single luminous elements of said display device.
5. (Previously Presented) The method according to claim 1, wherein said dithering function is a 1-, 2-, 3- or 4- bit dithering function.
6. (Previously Presented) The method according to claim 1, wherein said at least one motion vector is defined for each of a pixel or cell individually.
- 7 – 16 (Cancelled)
17. (Currently Amended) A device for processing video data of video pictures for display on a display device having a plurality of luminous elements, wherein said video data processing device comprises:
- a dithering device for applying a changeable dithering function to at least a part of said video data to refine a grey scale portrayal of video pictures of said video data;

a motion estimator connected to said dithering device for computing and providing at least one motion vector representing the movement of a moving object on a picture from said video data,

wherein at least one of a phase, an amplitude, a spatial resolution and a temporal resolution of said dithering function is ~~changeable in the device for processing video data~~ changed in accordance with said at least one motion vector in the dithering device, and

wherein said device for processing video data comprises means for outputting said dithered video data ~~dithered~~ to the display device to suppress a dithering pattern from appearing to a viewer observing the moving object on the display device.

18. (Currently Amended) The device according to Claim 17, wherein said dithering function used by said dithering ~~means~~ device includes two spatial dimensions and a temporal dimension.
19. (Currently Amended) The device according to Claim 17, wherein said dithering function of said dithering ~~means~~ device is based on a plurality of masks.
20. (Currently Amended) The device according to Claim 17, wherein said dithering function of said dithering ~~means~~ device is based on a single luminous element, said single luminous element called a cell of the display device.

21. (Currently Amended) The device according to Claim 17, wherein said dithering means device is able to process a 1-, 2-, 3- or 4-bit dithering function.

22. (Currently Amended) The device according to Claim 17, wherein said at least one motion vector is definable for each pixel of the display device individually by said motion estimation means device.

23. (Previously Presented) The device according to Claim 17, wherein said at least one motion vector includes two spatial dimensions.

24. (Currently Amended) The device according to Claim 17, further comprising gamma function means connected to said dithering means device, so that the input signals of said dithering means device are pre-corrected by a gamma function.

25. (Currently Amended) The device according to Claim 17, further comprising controlling means connected to said dithering means device for controlling said dithering means device temporally in dependence of frames of said video data.